

Serial No. 10/060,737

PATENT
Docket No. 58027-011100**AMENDMENTS TO THE CLAIMS**

Claim 1 (Currently Amended): ~~A system for mixing and combusting chemicals in a micro-machined chemical-mixing device, the system having:~~

walls of the device forming a chamber having an outlet;

an exhaust from the chamber, the exhaust being elongated and narrow relative to the length and width of the chamber;

an evaporator adjacent the chamber for evaporating a fluid reactant supplied through a non-pressurized inlet and introducing the evaporated fluid reactant into the chamber;

a feed path for supplying the fluid reactant to the evaporator;

an initiator for igniting the evaporated fluid reactant in the chamber;

first inlet for introducing a non-pressurized oxidizer into the chamber for forming a mixture of the evaporated fluid and the oxidizer;

the initiator providing energy to combust the mixture of the evaporated fluid and the oxidizer, thereby ~~sending a pressure wave through an outlet; the combustion of the evaporated fluid generating an acoustic wave, said acoustic wave being used to draw the oxidizer from the first inlet into the chamber; a subsequent combustion being provided by a wavefront of the acoustic wave, releasing pressure through the outlet, causing a pressure change in the chamber, the pressure change being used to draw in oxidizer to the chamber and form more of the mixture, providing a subsequent combustion generating a resonant frequency of pressure changes in the chamber to draw in more oxidizer and allow subsequent combustions at a resonant frequency~~ after the device achieves operational temperature and operational acoustic frequency; and

wherein the evaporator includes a membranous pad having a plurality of patterned holes and grooves for increasing surface adhesion of the non-pressurized fluid reactant and flow of the fluid.

Claim 2 (Canceled)

Claim 3 (Currently Amended): The device of Claim 2 ~~1~~, wherein the oxidizer is in a gas phase.

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Claim 4 (Previously Presented): The device of Claim 3, wherein the gas is ambient air.

Claim 5 (Currently Amended): The device of Claim 2 1, wherein the fluid reactant is evaporated into the chamber by the evaporator and mixed with the oxidizer to form a reacting mixture.

Claim 6 (Canceled)

Claim 7 (Canceled)

Claim 8 (Currently Amended): The device of Claim 1, wherein the feed path includes at least one channel for delivering the fluid to the evaporator, ~~said feed path being designed to aid evaporation.~~

Claim 9 (Canceled)

Claim 10 (Previously Presented): The device of Claim 1, wherein the evaporator, the chamber and the initiator are formed from at least one of silicon, plastic, ceramic, and glass based material, the material being selected based upon operating temperature.

Claim 11 (Previously Presented): The device of Claim 1 wherein the evaporator is located substantially adjacent to and gaseously connected to the chamber to convert a chemicals from a liquid phase into a gaseous phase chemical for introduction into the chamber.

Claim 12 (Currently Amended): The device of Claim 2 1, wherein at least two different fluids are supplied to the evaporator by at least two separate inlets for mixing with the oxidizer.

Claim 13 (Canceled)

Claim 14 (Currently Amended): The device of Claim 12, wherein the oxidizer is a gas supplied from outside the device and introduced to the chamber through ~~an~~ the first inlet passing through the walls of the chamber for mixing with at least two different evaporated fluids within the chamber.

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Claim 15 (Currently Amended): The ~~micro~~-device of Claim 1, wherein the initiator comprises at least one of a spark or glow wires to provide initial combustion and ~~engine-throttle~~ control of the reaction.

Claim 16 (Canceled)

Claim 17 (Currently Amended): The device of Claim 2 1, further including at least one temperature sensor for detecting efficient mixing between the oxidizer and the fluid, said at least one temperature sensor being part of the chamber.

Claim 18 (Previously Presented): The device of Claim 17, further including at least one pressure sensor for detecting efficient mixing between the oxidizer and the fluid.

Claim 19 (Previously Presented): The device of Claim 1 wherein the device contains no valves, chemical pumps, pressurized chemical lines or pumps for operation of said device.

Claim 21 (Canceled)

Claim 22 (Currently Amended): The device of Claim 24 1 wherein the evaporator delivers the chemical in a non-pressurized state to the chamber.

Claim 23 (Canceled)

Claim 24 (Canceled)

Claim 25 (Canceled)

Claim 26 (Previously Presented): The device of Claim 1 wherein the device contains no moving mechanical parts.

Claim 27 (Currently Amended): A system for mixing and combusting chemicals in a micro-machined chemical-mixing device, the system having:

walls of the device forming a chamber having an outlet;

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an exhaust from the chamber, the exhaust being elongated and narrow relative to the length and width of the chamber;

an evaporator adjacent the chamber for evaporating a fluid reactant supplied through a non-pressurized inlet and introducing the evaporated fluid reactant into the chamber;

a feed path for supplying the fluid reactant to the evaporator;

an initiator for igniting the evaporated fluid reactant in the chamber;

the initiator providing energy to combust the mixture of the evaporated fluid and the oxidizer, thereby ~~sending a pressure wave through an outlet; the combustion of the evaporated fluid generating an acoustic wave, said acoustic wave being used to draw the oxidizer from the first inlet into the chamber; a subsequent combustion being provided by a wavefront of the acoustic wave; releasing pressure through the outlet, causing a pressure change in the chamber, the pressure change being used to draw in oxidizer to the chamber and form more of the mixture, providing a subsequent combustion generating a resonant frequency of pressure changes in the chamber to draw in more oxidizer and allow subsequent combustions at a resonant frequency;~~
and

wherein the evaporator includes a membranous pad having a plurality of patterned holes and grooves for increasing surface adhesion of the non-pressurized fluid reactant and flow of the fluid.

Claim 28 (Currently Amended): The device of Claim 27 wherein the evaporator includes a the membranous pad having formations to increase surface adhesion of the non-pressurized fluid reactant and flow of the fluid.

Claim 29 (Canceled)

Claim 30 (Canceled)

Claim 31 (Canceled)

Claim 32 (Currently Amended): A system for mixing and combusting chemicals in a micro-machined chemical-mixing device, the system having:

walls of the device forming a chamber having an outlet;

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an exhaust from the chamber, the exhaust being elongated and narrow relative to the length and width of the chamber;

an evaporator adjacent the chamber for evaporating a fluid reactant supplied through a non-pressurized inlet and introducing the evaporated fluid reactant into the chamber;

a feed path for supplying the fluid reactant to the evaporator;

an initiator for igniting the evaporated fluid reactant in the chamber;

the initiator providing energy to combust the mixture of the evaporated fluid and the oxidizer, thereby ~~sending a pressure wave through an outlet; the combustion of the evaporated fluid generating an acoustic wave, said acoustic wave being used to draw the oxidizer from the first inlet into the chamber; a subsequent combustion being provided by a wavefront of the acoustic wave, releasing pressure through the outlet, causing a pressure change in the chamber, the pressure change being used to draw in oxidizer to the chamber and form more of the mixture, providing a subsequent combustion generating a resonant frequency of pressure changes in the chamber to draw in more oxidizer and allow subsequent combustions at a resonant frequency~~ after the device achieves operational temperature and operational acoustic frequency; and

wherein the evaporator includes a membranous pad for increasing surface adhesion of the non-pressurized fluid reactant and flow of the fluid.

Claim 33 (Canceled)

Claim 34 (Canceled)

Claim 35 (Canceled)

Claim 36 (New): A method of mixing and combusting chemicals comprising:

providing a micro-machined chemical mixing device wherein walls of the device form a chamber with an outlet;

supplying a fluid reactant via a first inlet to an evaporator comprising an membranous pad having a plurality of patterned holes and grooves for increasing surface adhesion of the non-pressurized fluid reactant and flow of the fluid reactant adjacent to the chamber;

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introducing the evaporated fluid reactant into the chamber through a non-pressurized inlet to the chamber;

introducing an oxidizer into the chamber through a second inlet to the chamber for forming a mixture of the evaporated fluid and the oxidizer;

providing energy to initiate and cause a combustion of the mixture;

releasing pressure from the combustion through the outlet causing a pressure change in the chamber;

utilizing the pressure change to draw in oxidizer to the chamber through the second inlet; allowing a subsequent combustion;

and generating a resonant frequency of pressure changes in the chamber caused by periodic combustion to periodically draw in more oxidizer and allow subsequent periodic combustions at a resonant frequency.

Claim 37 (New): The method of Claim 36, wherein the oxidizer introduced is in a gas phase.

Claim 38 (New): The method of Claim 37, wherein the gas comprises ambient air.

Claim 39 (New): The method of Claim 36 further comprising supplying at least two different fluids are supplied by at least two separate inlets for mixing with the oxidizer.